Exhibit 3

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Ward

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(54) **SYSTEM AND METHOD FOR CREATING DYNAMIC PLAYLISTS**

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(22) Filed: **Nov. 15, 2000**

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(51) **Int. Cl.**[7] **G06F 17/30**
(52) **U.S. Cl.** **707/102**; 707/104.1
(58) **Field of Search** 707/104.1, 102

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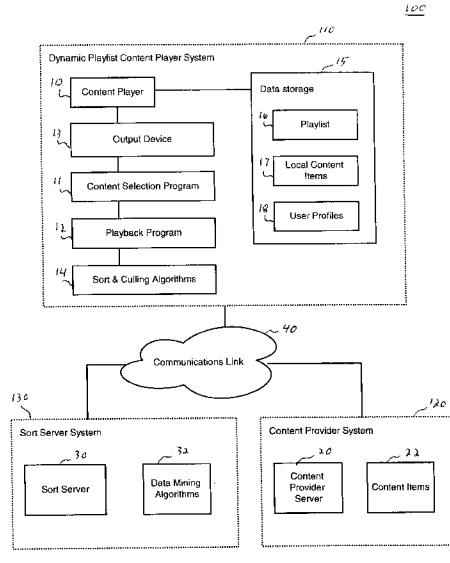
(57) **ABSTRACT**

Method and system provided for creating a dynamic playlist including meta-data having potential association with a respective content item configured to be played on a content player, and having dynamic addition of subtraction of playlist items. The system maintains a database of linkages between elements associated with content items as well as weighted linkages between elements and respective properties. The system is a hybrid content based and collaborative filtering system, wherein the insertion of a new item into the database results in the new item sharing preference weights and number of preferences associated with items pre-existing in the database. Thus, an initial input query list of items potentially results in the return of many content, called a "dynamic playlist", has a high correlation with the user's preference or with whatever other basis was used to frame the input list, and individual content items on the dynamic playlist may not have been previously experienced by the user.

24 Claims, 7 Drawing Sheets



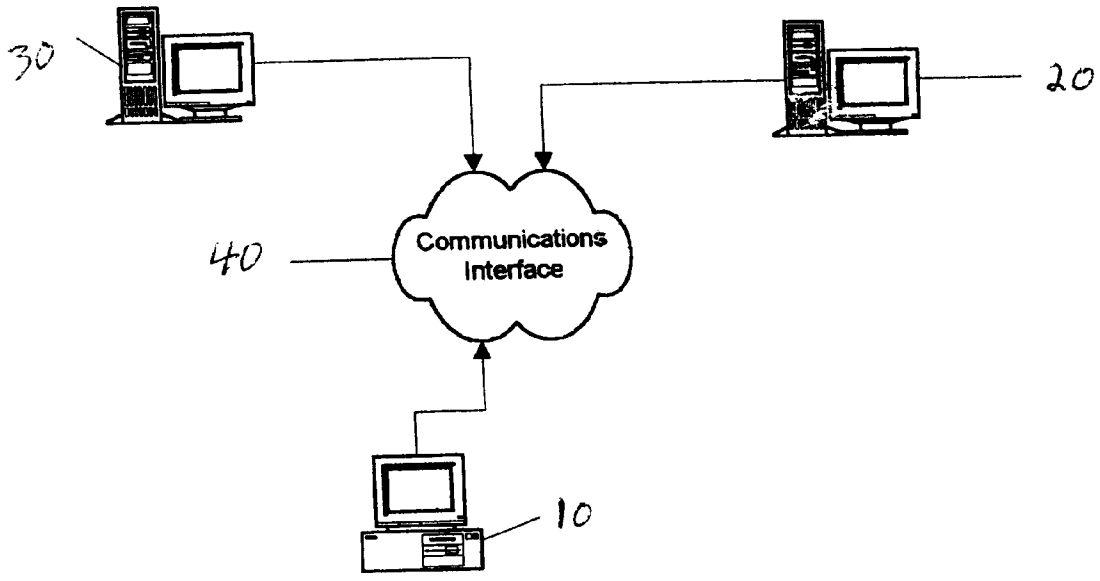


Fig. 1

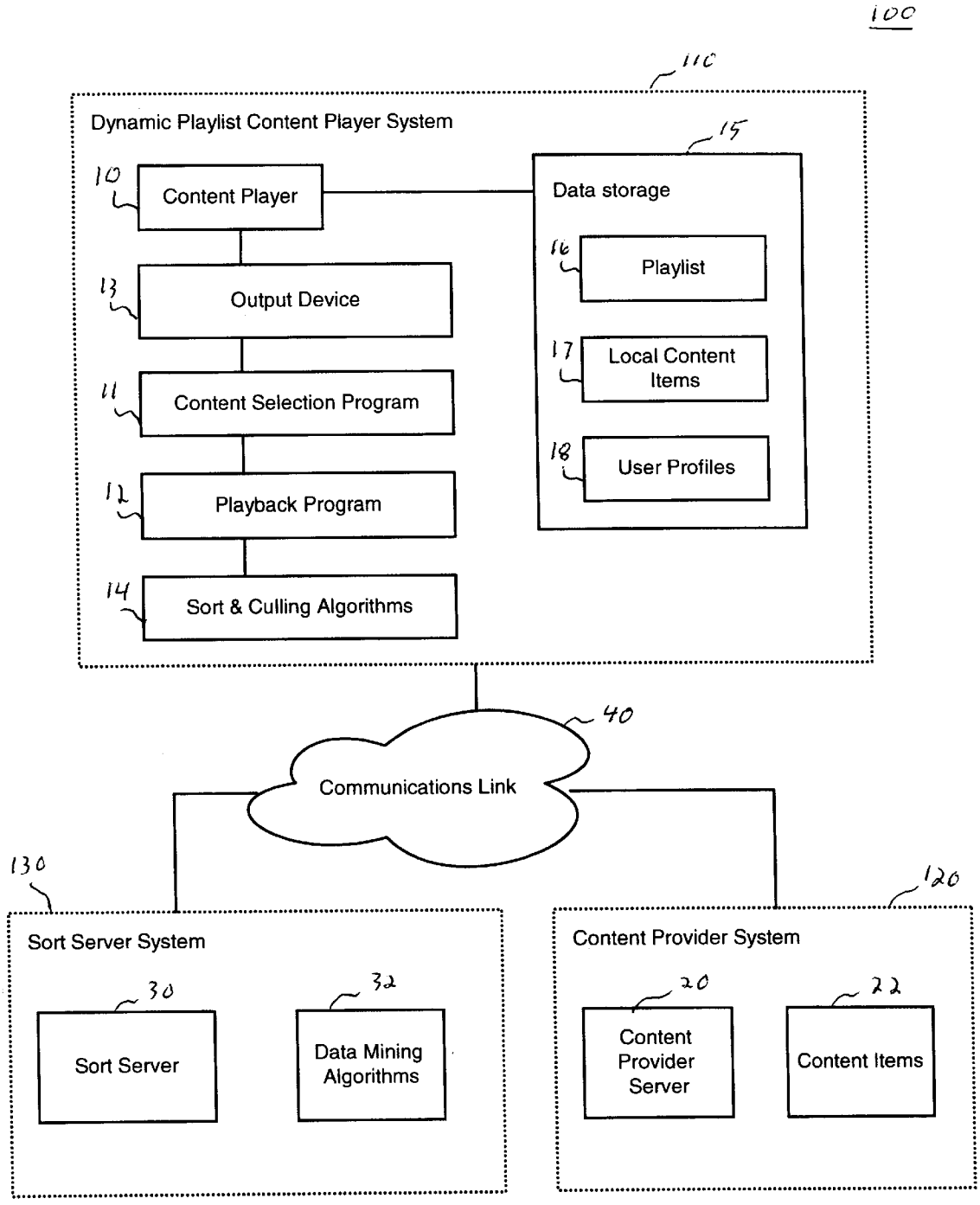

100
110
Dynamic Playlist Content Player System
15
10
Content Player
Data storage
16
Playlist
13
Output Device
17
Local Content Items
11
Content Selection Program
18
User Profiles
12
Playback Program
14
Sort & Culling Algorithms
40
Communications Link
130
120
Sort Server System
Content Provider System
30
32
20
22
Sort Server
Data Mining Algorithms
Content Provider Server
Content Items

FIG. 2

FIG. 3

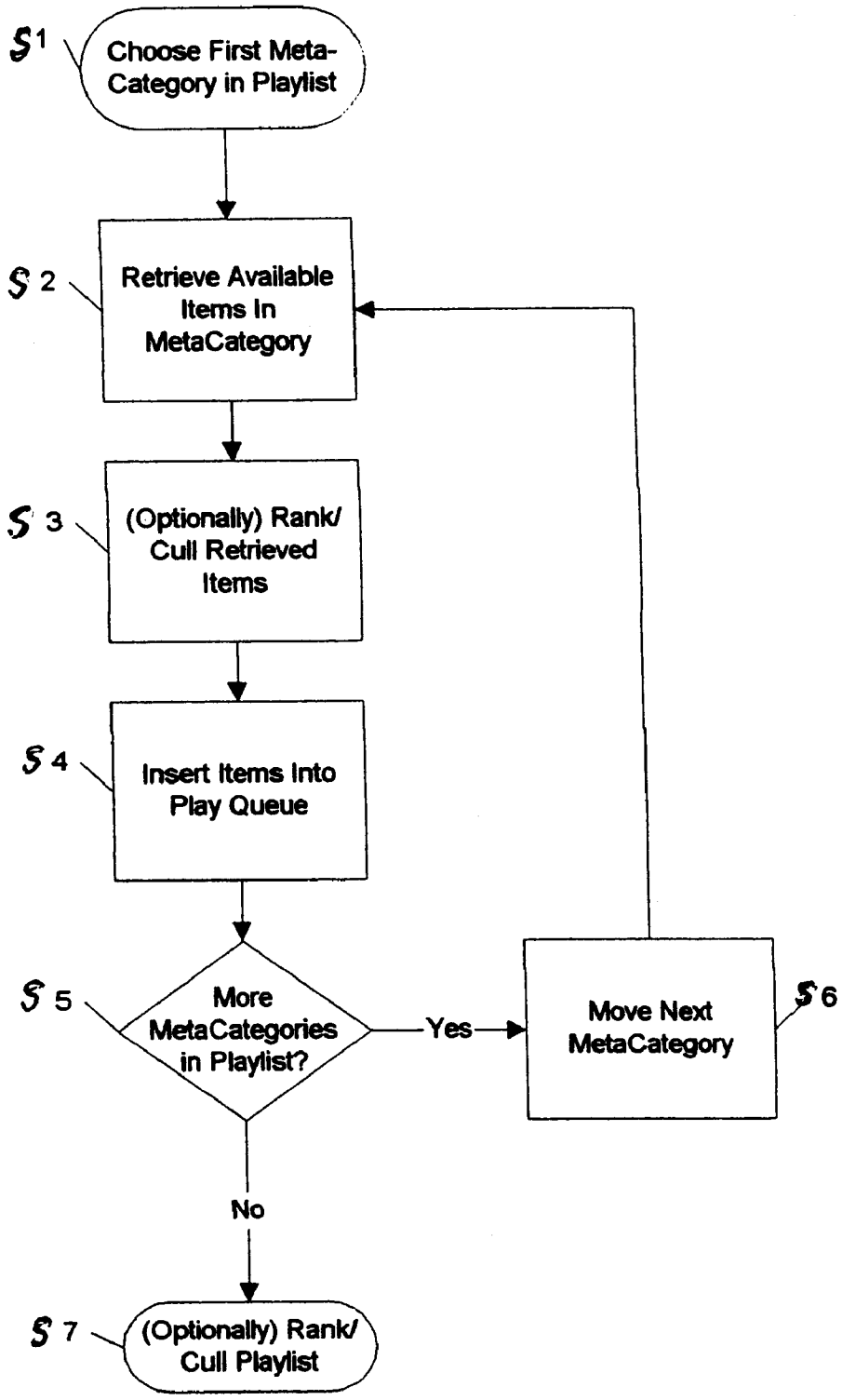
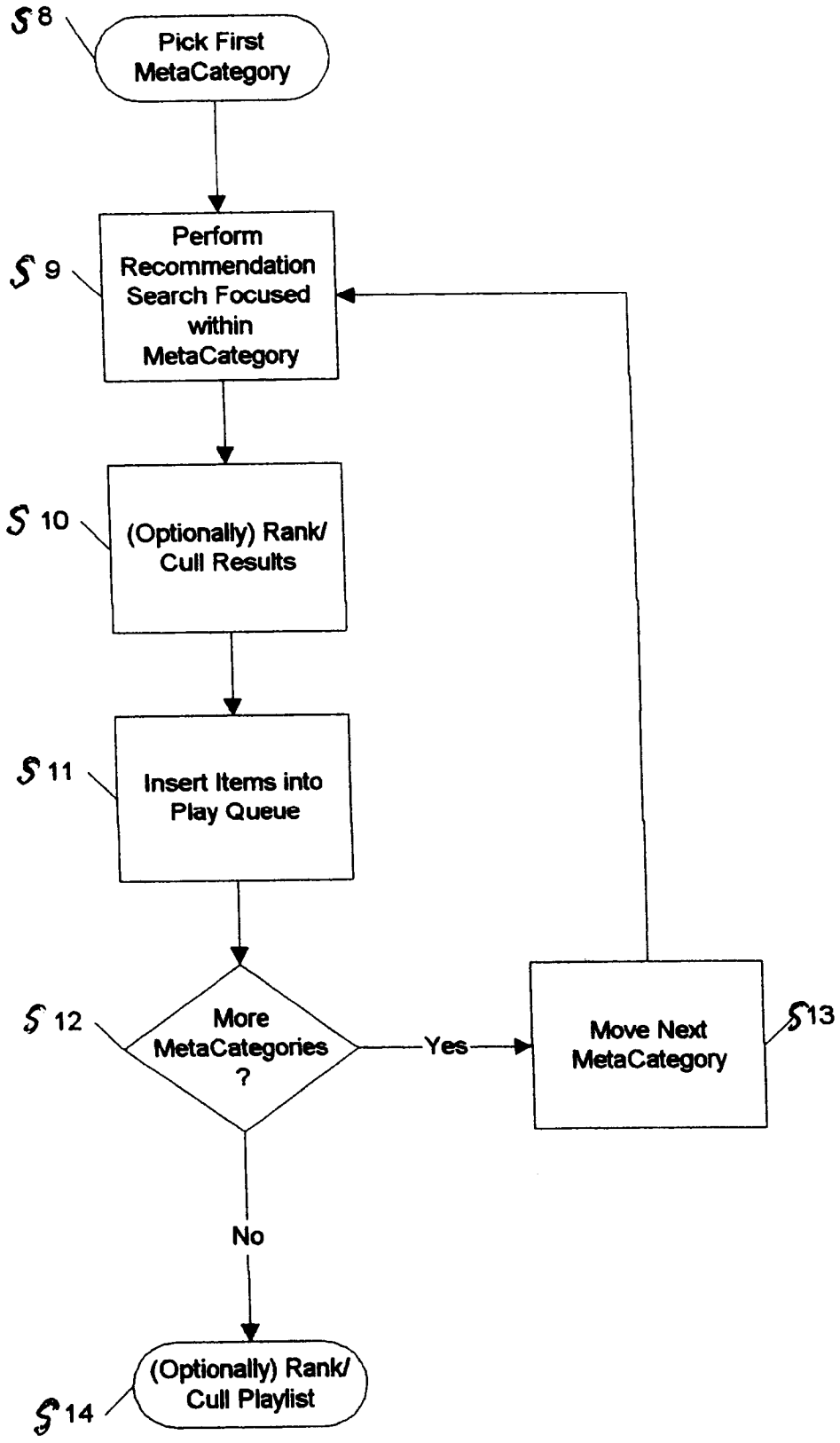

S1
Choose First Meta-Category in Playlist
S2
Retrieve Available Items In MetaCategory
S3
(Optionally) Rank/ Cull Retrieved Items
S4
Insert Items Into Play Queue
S5
More MetaCategories in Playlist?
Yes
S6
Move Next MetaCategory
No
S7
(Optionally) Rank/ Cull Playlist

FIG. 4


S8
Pick First MetaCategory
S9
Perform Recommendation Search Focused within MetaCategory
S10
(Optionally) Rank/ Cull Results
S11
Insert Items into Play Queue
S12
More MetaCategories ?
Yes
S13
Move Next MetaCategory
No
S14
(Optionally) Rank/ Cull Playlist

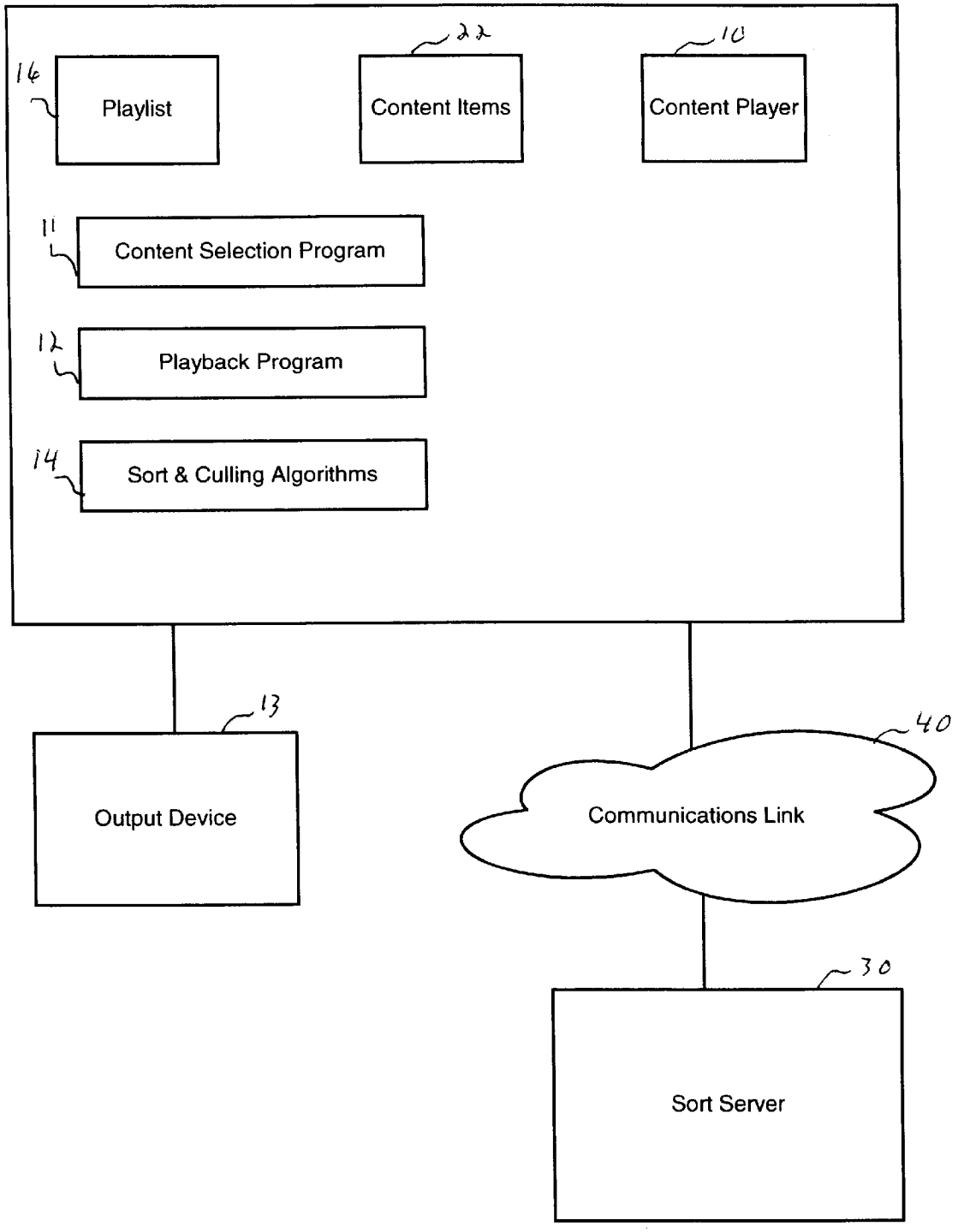

16
Playlist
22
Content Items
10
Content Player
11
Content Selection Program
12
Playback Program
14
Sort & Culling Algorithms
13
Output Device
40
Communications Link
30
Sort Server

FIG. 5

FIG. 6

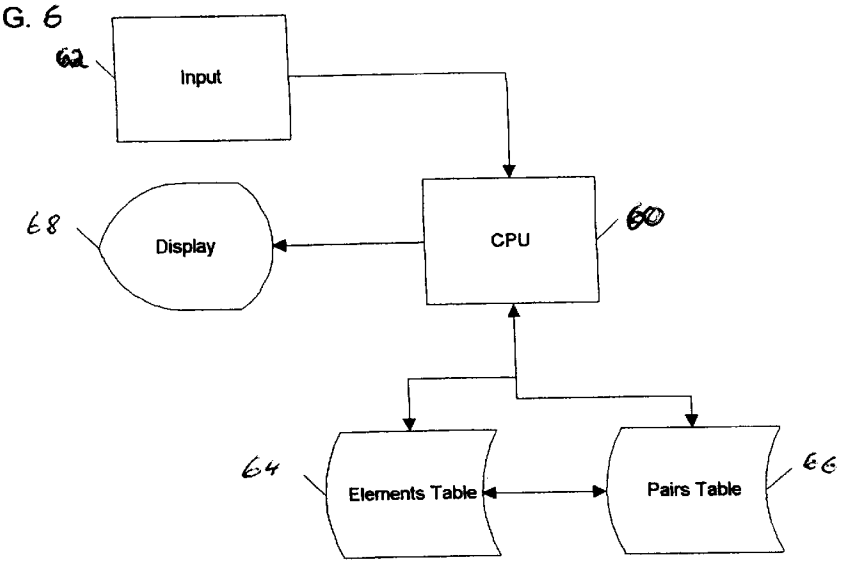

62
Input
68
Display
CPU
60
64
Elements Table
Pairs Table
66

FIG. 7

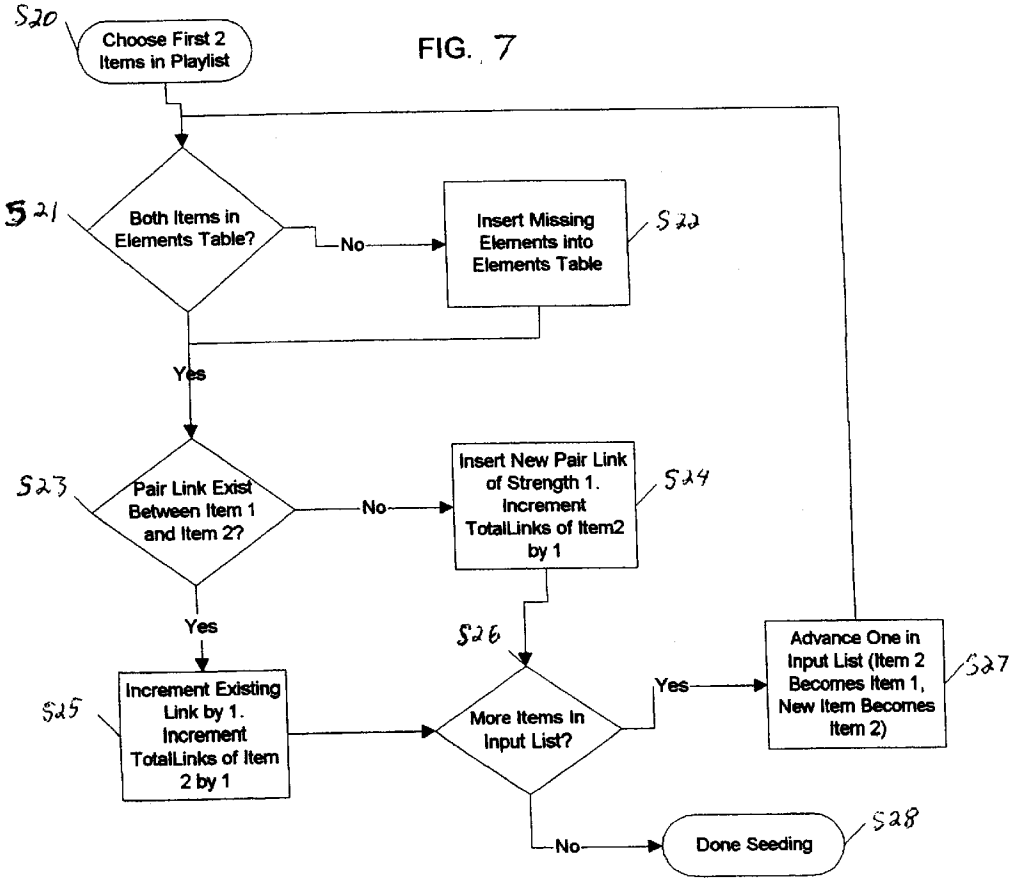
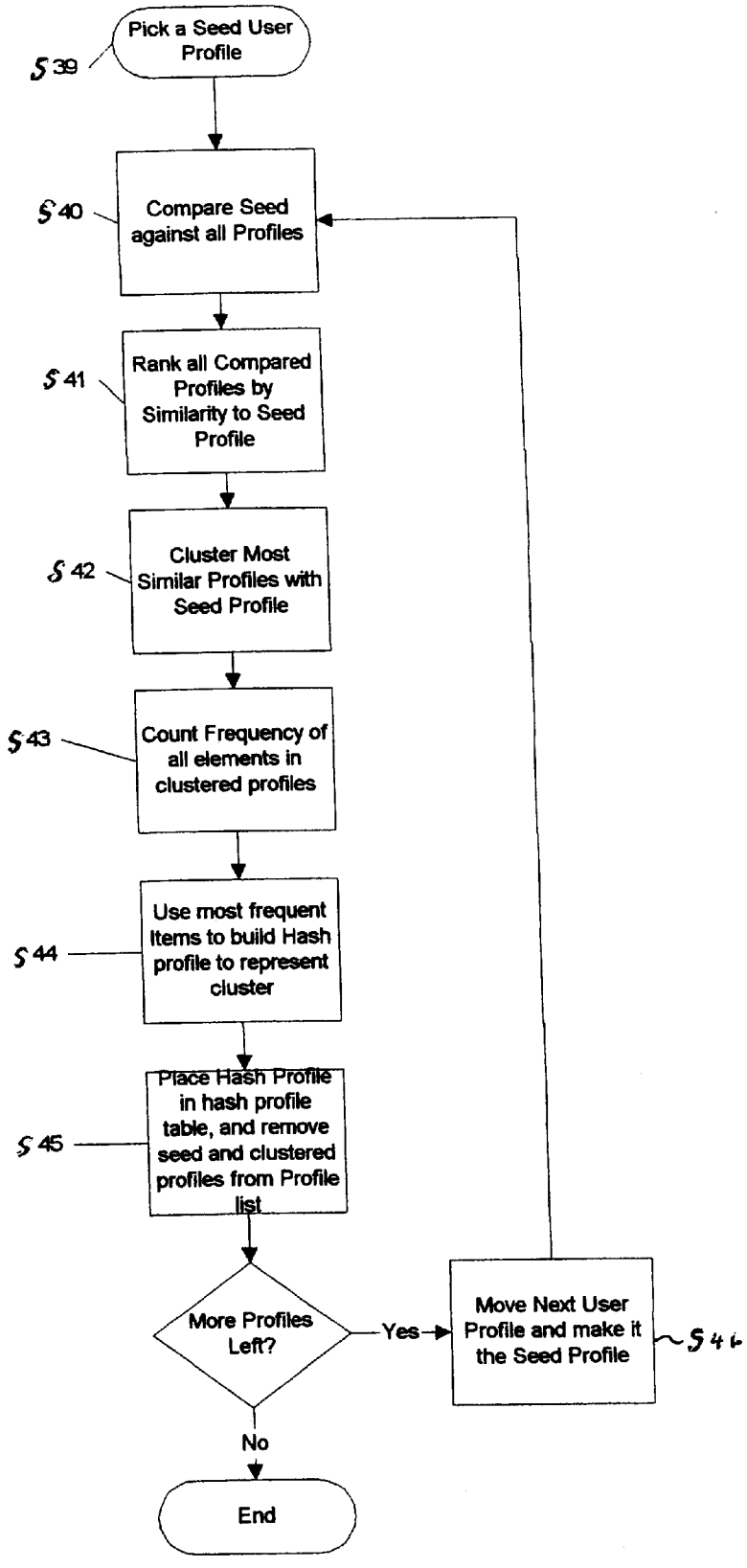

S20
Choose First 2 Items in Playlist
S21
Both Items in Elements Table?
No
Insert Missing Elements into Elements Table
S22
Yes
S23
Pair Link Exist Between Item 1 and Item 2?
No
Insert New Pair Link of Strength 1. Increment TotalLinks of Item2 by 1
S24
Yes
S26
Increment Existing Link by 1. Increment TotalLinks of Item 2 by 1
S25
More Items In Input List?
Yes
Advance One in Input List (Item 2 Becomes Item 1, New Item Becomes Item 2)
S27
No
Done Seeding
S28

FIG. 8


Pick a Seed User Profile
S39
Compare Seed against all Profiles
S40
Rank all Compared Profiles by Similarity to Seed Profile
S41
Cluster Most Similar Profiles with Seed Profile
S42
Count Frequency of all elements in clustered profiles
S43
Use most frequent Items to build Hash profile to represent cluster
S44
Place Hash Profile in hash profile table, and remove seed and clustered profiles from Profile list
S45
More Profiles Left?
Yes
Move Next User Profile and make it the Seed Profile
S46
No
End

SYSTEM AND METHOD FOR CREATING DYNAMIC PLAYLISTS

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application claims the benefit of U.S. Provisional Application No. 60/165,726 filed Nov. 15, 1999. That application and the present inventor's U.S. Provisional Application Nos. 60/165,727 and 60/166,039 filed respectively on Nov. 15, 1999 and Nov. 17, 1999 are hereby incorporated by reference. The present application also incorporates by reference the present inventor's application Ser. No. 09/712,261 and the No. 60/165,727 Provisional Application) filed concurrently herewith.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to a system and method for music and/or video playback, and more particularly, providing to the user recommendations of items which have not yet been sampled by the user, based on a list of items already sampled by the user, utilizing a method for the dynamic addition, subtraction and sorting of a queue of items for playback.

2. Description of Related Art

The concept of a playlist is old, i.e. a static list of items to be played one by one through its entirety, in the order listed in the playlist. So far, only rudimentary attempts at dynamic playback have been made, consisting mainly of randomizing the order in which selections from the playlist are played. Some attempts have been made to let people quickly create playlists based on particular artists, or albums, or styles of music. However, all of them are still a static list after they are created, and don't automatically reorder themselves in a pleasing way, or incorporate new content which would fit with them as it is made available. Additionally, any slightly complex concept such as building a playlist which contains more than one piece of meta-data, such as, for example, more than one artist, typically requires complex Boolean logic statements to build, making such playlist creation processes inaccessible to those unskilled in Boolean techniques.

A system is needed that is easy to use, adapts to personal tastes, and can easily add or subtract music or videos, as they become available. Such a system should provide more than random sorting and shuffle-play options to overcome the deficiencies of a static playlist, so that the playlist becomes dynamic.

It is therefore a principal object of the present invention to provide a dynamic playlist system and method for a dynamic playlist of digital items that automatically adds items to, or subtracts items from, the playlist, as the items become available.

An object of the present invention is to provide the dynamic playlist system where the data items are music or video items.

Another object of the present invention is to provide a dynamic playlist that dynamically adapts to usage patterns.

Another object of the present invention is to provide a dynamic playlist that dynamically adapts to personal preferences.

Another object of the present invention is to provide a dynamic playlist that is easy to use.

SUMMARY OF THE INVENTION

The above objects are obtained according to the present invention in which a method and system is provided for creating a dynamic playlist including meta-data having potential association with a respective content item configured to be played on a content player.

The system maintains a database of linkages between elements associated with content items as well as weighted linkages between elements and respective properties. The system is a hybrid content based and collaborative filtering system, wherein the insertion of a new item into the database results in the new item sharing preference weights and number of preferences associated with items pre-existing in the database. Thus, an initial input query list of items potentially results in the return of many content items available from one or more content providers, wherein the retrieved content, called a "dynamic playlist", has a high correlation with the user's preference or with whatever other basis was used to frame the input list, and individual content items on the dynamic playlist may not have been previously experienced by the user.

A dynamic playlist is a list of items that can be played in linear order, as is done with a traditional playlist, or in more exotic sequences after application of sorting or ordering algorithms. User profiles can be applied to the sorting process, i.e., by ranking items based on the user's meta-data, which can include usage patterns or explicit preferences, and further, by order reflected by usage of other users.

The most useful aspect of a dynamic playlist is the dynamic addition and subtraction of playlist items. This is accomplished by accepting at least one meta category defined as a set of at least one criterion, where each criterion has a potential association with a content item, and retrieving from at least one content provider a first result set of meta-data fitting any of the criteria, wherein the first result set enables acquisition of content items to be played. Next, a filtered first result set is calculated by application of a collaborative filtering query algorithm to the first result set, and then the filtered first result set is added to the dynamic playlist. Next, the system seeds a next meta-category, if any, with the result set and repeating the retrieving, calculating, inserting and seeding steps until all meta-categories have been processed. In accordance with this method, an initial meta-category of selection preferences potentially results in the return of many content items available from one or more content providers, wherein the retrieved content has a high correlation with the user's preference or with whatever other basis was used to frame the meta-category.

The collaborative filtering query algorithm can be arranged to include the dynamic playlist itself, which becomes especially meaningful subsequent successive playlist updates. The algorithm can also include user play pattern data including manual intervention detected during playing of contents associated with the dynamic playlist, or rating data indicative of preference or distaste for selected content items.

The method for creating a dynamic playlist also includes accessing a database configured to include meta-data elements, wherein each element defines at least one relationship between a user and a respective content item, identifying at least one meta-category from the database, and updating the database to include at least parts of the dynamic playlist.

The method for creating a dynamic playlist also includes applying a reordering algorithm to the filtered first result set to obtain the dynamic playlist. The ordering algorithm is selected from a group of algorithms including a ranking algorithm, a random element removal algorithm, a retention of top N most popular elements algorithm, and a pairing sort algorithm.

In a separate embodiment, a respective second result set is obtained for each meta-category, wherein the respective second result set includes meta-data identifying all content items fitting any at least one criterion of each meta-category. An ordering algorithm is applied to the second result set to obtain the dynamic playlist.

The pairing sort algorithm begins with selecting a first and second item from the playlist, determining if both elements are in an elements table, inserting whichever element is missing into the elements table, incrementing by 1 a pair link between the first and second elements, and incrementing by 1 a counter associated with the second element. If a pair link exists between the first and second items, the algorithm inserts a new pair link of strength **1** between the first and second items and increments by 1 a counter associated with the second item. If a pair link does not exist between the first and second items, and if another item remains in the playlist, the algorithm identifies the first item as the second item and the other item as the second item. The sequence is repeated until no items remain in the playlist.

Alternatively, the input set can either be associated with other input sets by a profile ID, or be a seed user profile, i.e., a single individual or source that submits the input sets, or the input set is simply collected on a stand-alone basis. This allows the creation of aggregate profiles between a series of queries or seed actions. Finally, if the action is a query, several profile ID's could be used to create a composite view of the multiple profiles, such as, for example, to find a song both a husband and wife would enjoy.

The pairing sort algorithm as applied to at least one user profile begins with selecting a seed user profile, and processes the steps of comparing the seed user profile against all available profiles, ranking all compared profiles by similarity to the selected seed profile, clustering the most similar profiles with the seed profile, counting the frequency of all elements in the clustered profiles, building a hash profile of the most frequent items to represent each respective cluster, placing the respective hash profile in a hash table, removing the seed and clustered profiles from the profile list, identifying a next user profile, if available, as the seed user profile, and continuing the sequence until no profiles are available.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features of the present invention and the attendant advantages will be readily apparent to those having ordinary skill in the art, and the invention will be more easily understood from the following detailed description of the preferred embodiments taken in conjunction with the accompanying drawings, wherein like reference characters represent like parts throughout the several views.

FIG. **1** is a highly simplified schematic drawing of components of the dynamic playlist system **100** according to the present invention;

FIG. **2** is a simplified schematic drawing showing more details the system shown in FIG. **1**;

FIG. **3** is a logic flow diagram of the basic mode dynamic playlist algorithm according to the present invention;

FIG. **4** is a logic flow diagram of the recommendation mode dynamic playlist algorithm according to the present invention;

FIG. **5** is a schematic drawing of the recommendation mode dynamic playlist algorithm according to the present invention;

FIG. **6** is a schematic drawing of a sample pairing sort system according to the present invention;

FIG. **7** is a logic flow diagram of a sample pairing sort seed algorithm according to the present invention;

FIG. **8** is a simplified logic flow diagram of a hash clustering system according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

A simplified arrangement of components of the dynamic playlist system **100** according to the present invention is schematically shown in FIG. **1**, which includes a dynamic playlist content player **10**, a content provider system **20**, and a sort server **30**, all interconnected by a communications interface **40**. Any number of computers **10**, **20**, and **30** can be interconnected according to the present invention. For example, multiple client computers **10** can obtain content provided by one or more content provider computers **20**.

Communications interface **40** can be any type of bus, local area network, wide area network, or a global network such as the Internet. Alternatively, communications interface **40** includes wireless communications, satellite connections, or any other connection means, and is not shown in detail as such interfaces are well-known and commonly used in conjunction with distributed systems.

In a dynamic playlist, the playlist items can be played in linear order, as is done with a traditional playlist, or in more exotic sequences after application of sorting or ordering algorithms. For example, the playlist items can be sorted by grouping frequency, i.e., application of a pairing sort to the items. User profiles can be applied to the sorting process, i.e., by ranking items based on the user's meta-data, as discussed later, in connection with FIG. **8**. The items can be ranked by other user order frequencies, such as, for example, the order reflected in use by other users. While these all create a much more interesting playback order, somewhat like having a disk jockey who understands both the music/videos and the person listening/watching them, the most useful aspect of a dynamic playlist is the dynamic addition and subtraction.

Specifically, meta-elements can be added to the playlist, such as with music, the addition of an artist to the playlist. Then, when the playlist is used, the playlist queries a main server for the existence of content relating to that meta-data. I.e. adding an artist or group would add the entire given artist or groups content to the playlist, or would add the content not removed by anti-links (listed dislikes) existing in a user's profile. Additionally, it could be configured to add the content that was highest ranked as returned by a collaborative filtering query focused on the rest of the playlist's content, up to a certain number of songs. What this would allow is the creation of themed playlists that were random, yet fit together. Additionally, it would allow users to subscribe to artists and automatically have their playlists updated with new content, such as when an artist releases a new song, by having playlists which contained the meta-category of a particular artist included in their playlist. That would be a valuable opportunity for both users and artists to connect.

A playlist could also be made entirely of meta-elements. For example, it could contain two artists (a meta-category). First the system would build a result list of all the elements which have the meta-categories which are in the playlist, such as all the songs an artist has produced. Next, a collaborative filtering query could be executed on the result list, to rank and/or cull the items that the current user would most enjoy in the list. After that, various randomization or ordering algorithms could be applied to make the playlist

"flow" in an effective manner from item to item. For example, the pairing sort described in FIG. **6**, to be described later, could be executed. A playlist made in that manner would be fresh each time it was played, as it would pick new content and alter its playback order each time it was used.

Additionally, several ranking and/or culling techniques can be applied to the generated playlists before or during playback. For example, a pairing order sort could be applied to the playlist, which would have the effect of ordering it in the most popular order. Therefore, musical pieces could be ordered to flow in the manner that most people have ordered them, which will most likely result in the most compatible ordering. A sample pairing sort routine is shown in FIG. **6**, to be described later. Additionally, the most incompatible elements could optionally be discarded from the sorted list.

As another example, a popularity sort could also be applied, wherein the results are then ranked based on overall popularity among all listeners, or the subset closest to the current playlist creator. As another option, the least popular items could be culled, or given higher weightings if the user desired. Other common sort mechanisms, such as by artist, random, meta-category, least popular, or album ordered could also be implemented.

FIG. **2** shows the arrangement of FIG. **1** in greater detail, including a simplified schematic diagram of the major functional components of the dynamic playlist system **100**. The arrangement of FIG. **2** is one of many possible arrangements of the functional elements of the present invention and serves to facilitate their description and general concept of the present invention. Other arrangements will be described later.

The dynamic playlist system **100** is conceptionally organized into three separate systems, including a dynamic playlist content player system **110** and content provider server system **120** arranged to operate in a known client-server mode. Sort server system **130** is optional to the extent that its function is to provide sophisticated filtering services by way of collaborative filtering algorithms, and operates in support of the dynamic playlist content player system **110** in those embodiments calling for such services. Moreover, content item storage can be a shared function with local storage being locally accessible by dynamic playlist content player system **110** with additional content being accessible from remote storage associated with one or more content provider systems **120**.

The dynamic playlist client system **110** includes a content player **10**, which includes known devices for playback of audio or video files, taking the form of popular computer programs for use on personal computers, as well as integrated video and audio stereo systems. In the preferred embodiment, content player **10** is operably connected to a content selection program **11** and a playback program **12** arranged to operatively control peripheral devices including an output device **13**, which can be any device configured to play or display file objects such as, for example, audio, graphic, and video files. Video files can include motion picture films, computer games, and the like. Content player **10** also includes, and is operably responsive to, known input, display, memory, and processor devices commonly associated with computers. Content player **10** includes a data storage device **15** configured to operate one of any type of data storage model, including, but not limited to, a relational data base. Regardless of the data storage model employed, data storage device **15** includes storage of a meta-data playlist **16**, optional storage of local content items **17**, and at least one user profile **18**, all to be described later.

The content provider system **120** includes a content provider server **20**, which is a local storage system **22** configured for storing content items, such as, for example, audio or video content items. The content items stored on content provider system **20** are stored in any of the known data storage models, such as, for example, a relational database. Stored content items are associated with respective meta-information, both of which can be accessed over communication interface **40** by content selection program **11** located on content player **10**. As discussed in detail below, retrieved content items optionally can be post-processed by data mining relational algorithms **32** located on sort server **30** and sorting and culling algorithms **14** associated with the content player **10**, and then output on output device **13**. Any of the known relational algorithms can be used in connection with the present invention and all variations of algorithm type and installation configurations are intended to be included within the scope of the present invention, such as, for example, the Firefly system as disclosed in U.S. Pat. No. 5,749,081, the Hey systems as disclosed in U.S. Pat. Nos. 4,870,579 and 4,996,642, or the approaches in the Rose system as disclosed in U.S. Pat. No. 5,724,567. All variations of algorithm type and installation configurations are intended to be included within the scope of the present invention.

A sort server system **130** includes a server **30** configured to run profile based subjective recommendation or data mining algorithms **32**, which also are not shown in detail, as their use is well-known and commonly used in the art of collaborative and recommendation filtering. Alternatively, algorithms **32** can be located at any of the three computers **10**, **20**, and **30**, provided sufficient computational power and network throughout are available. The sort server **30** is comprised of a known collaborative filtering engine and a pairing sort system, as described in FIGS. **6** and **7**.

It should be understood that the present invention might be readily adapted for alternate embodiments and modes of operation. For example, the content selection program **11** and playback program **12** could be accomplished using the directory structure of a hard drive, or the indexed database of content to which a user has access. The dynamic playlist system could be implemented in a variety of devices and mediums. For example, a computer program written in any of the many languages such as C++, that would allow advanced data structures on any platform that would allow content playback, could serve as the playlist content player **10**. Another form of the playlist content player **10** could take the form of a set top television box, or be within a stereo sound system, with the database of available titles being stored either within the devices themselves, or on a remote server system, which, potentially, can also serve the content. Additionally, aspects of the sort server system **130** and the content provider system **120** can be integrated into the content player system **110**.

FIG. **3** is a simplified flow diagram illustrating operation of one embodiment, the basic form, in which only a content provider **120** and a playlist consumer **110** are required. At step **S1**, when a playlist is executed, the playlist consumer picks a seed meta-category from the playlist. At step **S2**, It then queries available content providers for all content pieces fitting the seed meta-category. At step **S3**, optionally, it then applies ranking or culling algorithms to the results, such as randomly removing elements, or only keeping the top N most popular result items. Next, at step **S4** it inserts the results into the play queue, and continues at steps **S5** and **S6** to the next meta-category in the playlist and repeats the process. Finally, at step **S7**, it performs an optional ranking

or culling sort on the play queue, such as randomizing the play order, and begins playback. This mode of operation can be implemented in a non networked environment, but is less powerful than the recommendation mode of operation, to be described next, as it cannot apply advanced sort routines to the playlist. However, it does allow a playlist can be unique each time it is expanded, and can add new content without having to modify the playlist when the content providers make new content accessible.

FIG. **4** is a simplified flow diagram illustrating operation of one alternate embodiment, called the recommendation form, in which a third system element, sort server system **130**, is added to the basic form illustrated in FIG. **3**. The addition of a central sort server system **130** allows advanced profile based collaborative filtering or pairing sort queries to be performed upon the dynamic playlists. In operation, the recommendation form playlist expansion is similar to that of the basic form, with the addition of the more sophisticated sort algorithms ranking and culling results after each step.

At step **S8**, a meta-category is chosen as the seed from the playlist. At step **S9**, the content providers are queried for available content in the seed meta-category and then the result content list is ranked and culled by performing a collaborative filtering query based on any static items within the playlist, with any results not in the content list received from the content providers discarded. At optional step **S10**, any additional ranking or culling algorithms can be performed, such as randomly discarding some elements, or ranking based on raw popularity. Next, at steps **S11**–**S13** the content list is inserted into the play queue, and the next meta-category in the playlist is chosen. At that point the process is repeated, using the results currently in the play queue to seed a collaborative filtering request after each list of available content pieces is returned from the content providers. Upon seeding the play queue with all meta-categories, a final ranking and culling pass can be performed, using any of the common playlist manipulation algorithms, and optionally, a pairing sort algorithm, to be described in connection with FIGS. **6** and **7**.

Finally, playback can commence. As items are played back from the play queue, the system also reports to the sort server that the user has listened to the item, to allow the collaborative filtering system to increase its understanding of the content. Additionally, each time two songs are listened to in sequence, their pairing is submitted to the sort server's pairing sort system to allow the pairing sorted to increase its understanding of the content as well.

FIG. **5** is a preferred rearrangement of the "client-server" configuration shown in FIG. **2**, wherein elements in common between FIGS. **2** and **5** share common reference numerals. Dynamic playlist content player **50** serves as content player **10** and further includes local content storage functionality as well as operating to access content stored remotely at content provider **120**. This jukebox style arrangement includes a program configured to access aspects of sort server **30** and content provider system **20**. The content player **10** is operably connected with content selection program **11**, the playback program **12**, at least one sorting and culling algorithm program **14**, stored content items **22**, and an output device **13**.

In operation, the dynamic playlist content player system **50** preferably is connected over the Internet to a separate sort server system **130**, and is configured to access both local content **22** and available streamable content **22** from content provider systems **120**. Thus, many content players can access any of multiple content provider systems as well as their respective individually stored content. The content provider systems **120** include a known indexed database of content items and respective meta-information. The content provider system is implemented using a relational database such as, for example, the Oracle™ relational database. The content providers serve their available content by any known means, such as, for example, through a streaming media server like RealServer™ or via known direct http streaming systems, such as Icecast™.

In the preferred embodiment, a user using system **50** builds a playlist containing both local content items and streamable items. The playlist is a stored index of meta-data elements each having an association with separately stored one or more content items. The content items may be stored locally or are streamable from a remote content provider. The meta-data elements can be of any configuration, and preferably include descriptors of at least one associated content item and optionally include descriptors relating to preferences of one or more users.

When the user plays the playlist, the playlist is submitted to the sort server system **130**, which performs the algorithm described in connection with FIG. **2** to expand all meta-categories into specific content items, by drawing upon the content available from the user's locally stored content pool and from streaming content providers. The system the returns the expanded playlist to the jukebox program, which then uses the playlist like a standard static playlist. Optionally, when the user expresses dislike for a particular content item, either by skipping the item or through a rating system, the system records such instances in the meta-data associated with the user, i.e., the user profile. Upon resubmission of the playlist to the sort server, a new playlist now adapted to the expressed tastes of the playlist listener is generated and the rejected content items are not selected based on the updated user profile. After the user stops or plays completely through the playlist, the list is submitted to the sort server to execute a pairing algorithm, described in connection with in FIGS. **6** and **7**, to allow the pairing sort engine shown in FIG. **6** to further adapt to how the user ordered the playlist.

FIG. **6** is a simplified schematic diagram of a sample pairing sort engine suitable for use by dynamic playlist system **100** to further adapt to how the user ordered the playlist. Other pairing algorithms which produce comparable results are also suitable in the present invention. CPU **60** receives input **62** in the form of the playlist as executed by the user using dynamic contest content player system **110**. CPU **62** applies a flow order sort algorithm, or pair sort algorithm, illustrated in FIG. **7**, to input **62** and updates elements table **64** and pairs table **66**, stores the result for further use and optionally makes the result available on display **68**.

FIG. **7** is a simplified flow diagram of the flow order sort algorithm used in the sample pairing sort engine shown in FIG. **6**. At step **S20**, system **100** selects the first two items, item **1** and item **2**, in the playlist. At steps **S21** and **S22**, if it is determined that both items (elements) are not in the elements table **64** shown in FIG. **6**, then the missing items(s) are inserted into table **64**. At steps **S23**–**S25**, the system increments a weight between the first item and the second item. This is accomplished, by determining that both items are in the elements table and whether a pair link exists between item **1** and item **2**. If a pair link does not exist, then at step **S24**, a new pair link of strength **1** is inserted between items **1** and **2** and a TotalLinks counter of item **2** is incremented by 1. If a pair link does exist between items **1** and **2**, then at step **S25**, the existing link in incremented by

1 and the TotalLinks counter of item **2** is incremented by 1. In either case, after the appropriate insertion step, step **S26** determines whether more items exist in the playlist. If yes, at step **S27**, the inquiry is advanced by one item in the playlist so that item **2** becomes item **1** and a new item becomes item **2**. If no more items remain in the playlist, then at step **S28**, the sort ends.

FIG. **8** is a simplified flow diagram of a hash clustering system according to the present invention in which successive seed profiles are compared with all profiles. At step **S39**, the dynamic playlist system **100** selects a user profile **18** from storage **17** and at step **S40**, compares the seed against all profiles available to system **100**. At step **S41**, all compared profiles are ranked by similarity to the selected seed profile. At step **S42**, the most similar profiles are clustered with the seed profile, and at step **S43**, the frequency of all elements in the clustered profiles are counted. At step **S44**, the most frequent items are used to build a hash profile to represent each respective cluster, and at step **S45**, the respective hash profile is placed in a hash table and the seed and clustered profiles are removed from the profile list. If more profiles are left to be considered, then at step **S46**, select the next user profile, make it the seed profile, and continue the sequence at step **S40**.

While this invention has been described in conjunction with specific embodiments thereof, it is evident that many alternative modifications and variations will be apparent to those skilled in the art. Accordingly, the preferred embodiments of the invention as set forth herein are intended to be illustrative, not limiting. Various changes may be made without departing from the true spirit and scope of the invention as defined in the following claims.

What is claimed is:

1. A dynamic playlist computer system for creating a dynamic playlist comprising:

a storage component configured to store an elements table and a pairs table;

a first component configured to accept at least one meta-category, said at least one meta-category being a set of at least one criterion, said at least one criterion having a potential association with a content item;

a second component configured to retrieve from at least one content provider a result set of meta-data fitting any said at least one criterion, wherein said result set enables acquisition of content items associated with said meta-data;

a third component configured to insert the result set to said dynamic playlist; and

a fourth component configured to seed a next meta-category, if any, with the result set.

2. The dynamic playlist client system set forth in claim **1** further comprising a fifth component configured to reorder the dynamic playlist after insertion of the at least one content item into the dynamic playlist.

3. The dynamic playlist client system set forth in claim **1** further comprising a sixth component configured to reorder the dynamic playlist after insertion of the at least one content item into the dynamic playlist.

4. The dynamic playlist client system set forth in claim **3** further comprising a component for culling the at least one content item, whereby at least one of the at least one content item is removed.

5. The dynamic playlist client system set forth in claim **1** further comprising a sort server configured to perform collaborative filtering and paring sort calculations, said sort server being connected to said client component over the communications interface.

6. A method for creating a dynamic playlist, the dynamic playlist including meta-data having association with a respective content item configured to be played on a content player, the method comprising the steps of:

accepting at least one meta-category, said at least one meta-category being a set of at least one criterion, said at least one criterion having a potential association with a content item;

retrieving from at least one content provider a result set of meta-data fitting any said at least one criterion, wherein said result set enables acquisition of content items associated with said meta-data;

inserting the result set to said dynamic playlist; and

seeding a next meta-category, if any, with the result set and repeating said retrieving, inserting and seeding steps until all meta-categories have been processed.

7. The method for creating a dynamic playlist set forth in claim **6** wherein, the method further comprises applying a reordering algorithm to the result set to obtain the dynamic playlist.

8. The method for creating a dynamic playlist set forth in claim **7** wherein said reordering algorithm is selected from a group of algorithms including a ranking algorithm, a random element removal algorithm and a retention of top N most popular elements algorithm.

9. The method for creating a dynamic playlist set forth in claim **6** further comprising the step of applying an ordering algorithm to the dynamic playlist.

10. The method for creating a dynamic playlist set forth in claim **6** wherein said ordering algorithm is a random reordering algorithm.

11. The method for creating a dynamic playlist set forth in claim **6** wherein said at least one content provider is a provider selected from a group of providers including a local music collection, a central content server, and a peer-to-peer computer system.

12. A method for creating a dynamic playlist, the dynamic playlist including meta-data having association with a respective content item configured to be played on a content player, the method comprising the steps of:

accepting at least one meta-category, said at least one meta-category being a set of at least one criterion, said at least one criterion having a potential association with a content item;

retrieving from at least one content provider a result set of meta-data fitting any said at least one criterion, wherein said result set enables acquisition of content items associated with said meta-data;

calculating a filtered result set by application of a collaborative filtering query algorithm to the result set;

inserting said filtered result set to said dynamic playlist; and

seeding a next meta-category, if any, with the result set and repeating said retrieving, calculating, inserting and seeding steps until all meta-categories have been processed.

13. The method for creating a dynamic playlist set forth in claim **12** wherein the collaborative filtering query algorithm includes user play pattern data, said user play pattern including at least one manual intervention detected during playing of contents associated with the dynamic playlist.

14. The method for creating a dynamic playlist set forth in claim **12** wherein said at least one content provider is a provider selected from a group of providers including a local music collection, a central content server, and a peer-to-peer computer system.

15. The method for creating a dynamic playlist as set forth in claim 14 wherein the collaborative filtering query algorithm includes rating data, said rating data being indicative of preference and distaste for selected content items.

16. The method for creating a dynamic playlist set forth in claim 15 wherein, the method further comprises the step of applying a first reordering algorithm to the filtered result set.

17. The method for creating a dynamic playlist set forth in claim 16 wherein said first reordering algorithm is selected from a group of algorithms including a ranking algorithm, a random element removal algorithm, a retention of top N most popular elements algorithm, and a pairing sort algorithm.

18. The method for creating a dynamic playlist set forth in claim 17 further comprising the step of applying an second reordering algorithm to the dynamic playlist.

19. The method for creating a dynamic playlist set forth in claim 18 wherein said second reordering algorithm is a random reordering algorithm.

20. The method for creating a dynamic playlist set forth in claim 19 wherein each instance of said meta-data comprises an element and said pairing sort algorithm comprises the steps of:

selecting a first and second element from the playlist;

determining if both elements are in an elements table and inserting whichever element is missing into the elements table;

incrementing a weight between the first element and the second element; and

determining that another element remains in the playlist and if present, identifying said first element as said second element and said another element as said second element, and repeating said determining, incrementing and inserting steps until no elements remain in the playlist.

21. The method for creating a dynamic playlist set forth in claim 20 wherein said at least one meta-category is at least one user profile having associated elements, the method further comprising the steps of:

selecting a seed user profile;

comparing the seed user profile against all available profiles;

ranking all compared profiles by similarity to the selected seed profile;

clustering the most similar profiles with the seed profile;

counting the frequency of all elements in the clustered profiles;

building a hash profile of the most frequent items to represent each respective cluster;

placing the respective hash profile in a hash table;

removing the seed and clustered profiles from the profile list;

identifying a next user profile, if available, as the seed user profile; and

continuing said comparing through identifying steps until no profiles are available.

22. A method for creating a dynamic playlist, the dynamic playlist including meta-data having association with a respective content item configured to be played on a content player, the method comprising the steps of:

accepting at least one meta-category, said at least one meta-category being a set of at least one criterion, said at least one criterion having a potential association with a content item;

retrieving from at least one content provider a result set of meta-data fitting any said at least one criterion, wherein said result set enables acquisition of content items associated with said meta-data, said at least one content provider being a provider selected from a group of providers including a local music collection, a central content server, and a peer-to-peer computer system;

calculating a filtered result set by application of a collaborative filtering query algorithm to the result set;

applying a reordering algorithm to the filtered result set, said reordering algorithm being selected from a group of algorithms including a ranking algorithm, a random element removal algorithm, a retention of top N most popular elements algorithm, and a pairing sort algorithm;

inserting said filtered result set to said dynamic playlist; and

seeding a next meta-category, if any, with the result set and repeating said retrieving, calculating, inserting and seeding steps until all meta-categories have been processed.

23. The method for creating a dynamic playlist set forth in claim 22 wherein each instance of said meta-data comprises an element and said pairing sort algorithm comprises the steps of:

selecting a first and second element from the playlist;

determining if both elements are in an elements table and inserting whichever element is missing into the elements table;

incrementing a weight between the first element and the second element; and

determining that another element remains in the playlist and if present, identifying said first element as said second element and said another element as said second element, and repeating said determining, incrementing and inserting steps until no elements remain in the playlist.

24. The method for creating a dynamic playlist set forth in claim 23 wherein said at least one meta-category is at least one user profile having associated elements, the method further comprising the steps of:

selecting a seed user profile;

comparing the seed user profile against all available profiles;

ranking all compared profiles by similarity to the selected seed profile;

clustering the most similar profiles with the seed profile;

counting the frequency of all elements in the clustered profiles;

building a hash profile of the most frequent items to represent each respective cluster;

placing the respective hash profile in a hash table; removing the seed and clustered profiles from the profile list;

identifying a next user profile, if available, as the seed user profile; and

continuing said comparing through identifying steps until no profiles are available.

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